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IS 12495 (1988): Potassium ferricyanide, photographic grade [CHD 5: Electroplating Chemicals and Photographic Materials]

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Indian Standard

SPECIFICATION FOR POTASSIUM FERRICYANIDE PHOTOGRAPHIC GRADE

(First Reprint JULY 1990)

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BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

Gr 2

April 1989

Indian Standard

SPECIFICATION FOR POTASSIUM FERRICYANIDE, PHOTOGRAPHIC GRADE

0. FOREWORD

0.1 This Indian Standard was adopted by the Bureau of Indian Standards on 29 July 1988, after the draft finalized by the Photographic Materials Sectional Committee had been approved by the Chemical Division Council.

0.2 Potassium ferricyanide is commonly used in the processing of sensitized photographic materials. It is also known as potassium hexacyanoferrate (III). It has a chemical formula $K_3Fe\ (CN)_6$ and relative molar mass 329·2.

0.3 In the formulation of this standard, assistance has been drawn from ISO 3624-1976 'Photographic grade potassium ferricyanide', issued by the International Organization for Standardization (ISO).

0.4 This standard is one of a series of specifications for photographic grade chemicals which are commonly used in the processing of sensitized photographic materials. These specifications have been prepared to establish the criteria of purity which will provide a practical and economical grade and prevent possible faulty processing which might be caused by chemicals of inferior quality and to furnish manufacturers, suppliers and processors with reliable and readily available specifications for photographic chemicals of satisfactory quality.

0.5 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS : 2-1960*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

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*Rules for rounding off numerical values (*revised*).

1. SCOPE

1.1 This standard prescribes the requirements and methods of sampling and test for photographic grade potassium ferricyanide used in the processing of sensitized photographic materials.

2. REQUIREMENTS

2.1 Description — The material shall be in the form of red coloured fine granular crystals or crystalline powder. It may vary from very fine powder to very large crystals or lumps.

2.1.1 The particle size distribution of the material shall be as agreed to between the purchaser and the supplier.

2.2 Appearance of Solution — 1 g of sample shall dissolve in 100 ml of water to form a clear solution free from sediment other than a slight flocculence.

2.3 The material shall also comply with the requirements prescribed in Table 1 when tested according to the methods given in Appendix A. Reference to the relevant clauses of Appendix A is given in col 4 of Table 1.

TABLE 1 REQUIREMENTS FOR POTASSIUM FERRICYANIDE, PHOTOGRAPHIC GRADE

(*Clauses* 2.3, B-2.1, B-2-2, B-4.1, *and* B-4.2)

SL No.	CHARACTERISTIC	REQUIREMENT	METHOD OF TEST (REF TO CL NO. IN APPENDIX A)
(1)	(2)	(3)	(4)
i)	Assay [as $K_3Fe(CN_6)$] percent by mass, *Min*	99·0	A-2
ii)	Matter insoluble in water, percent by mass, *Max*	0·02	A-3

3. PACKING, MARKING AND SAFETY PRECAUTIONS

3.1 Packing — The material shall be packed in suitable, dark-coloured air-tight bottles or as agreed to between the purchaser and the supplier.

3.2 Marking — The container shall be securely closed and legibly and indelibly marked with the following information.

a) Name and grade (photographic) of the material;

b) Net mass of the material;

c) Date of manufacture;

d) Manufacturer's name and/or his recognized trade-mark, if any; and

e) Batch or lot number in code or otherwise to enable the batch of manufacture to be traced from the records.

3.2.1 The containers may also be marked with the Standard Mark.

NOTE — The use of the Standard Mark is governed by the provisions of the Bureau of Indian Standards Act 1986 and the Rules and Regulations made thereunder. The Standard Mark on products covered by an Indian Standard conveys the assurance that they have been produced to comply with the requirements of that standard under a well defined system of inspection, testing and quality control which is devised and supervised by BIS and operated by the producer. Standard marked products are also continuously checked by BIS for conformity to that standard as a further safeguard. Details of conditions under which a licence for the use of the Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

3.3 Safety Precautions — Normal precautions required in the performance of any chemical procedure must be exercised at all times.

4. SAMPLING

4.1 Representative samples of the material shall be drawn and their conformity to the standard determined as prescribed in Appendix B.

APPENDIX A

(*Clause* 2.3)

METHODS OF TEST FOR POTASSIUM FERRICYANIDE, PHOTOGRAPHIC GRADE

A-1. QUALITY OF REAGENTS

A-1.1 Unless specified otherwise, pure chemicals and distilled water (*see* IS : 1070-1977*) shall be used in tests.

NOTE — 'Pure chemicals' shall mean chemicals that do not contain impurities which affect the results of analysis.

A-2. DETERMINATION OF ASSAY

A-2.1 Reagents

A-2.1.1 *Potassium Iodide* — solid.

A-2.1.2 *Acetic Acid* — glacial.

A-2.1.3 *Zinc Sulphate* — 1 M solution.

A-2.1.4 *Sodium Thiosulphate* — 0·1 N solution.

A-2.1.5 *Starch Indicator Solution* (5 g/l) — Stir 5 g of soluble starch with 100 ml of 10 g/l salicylic acid. Add 300 to 400 ml of boiling water, boil until the starch dissolves and finally dilute to 1 000 ml with water.

A-2.2 Procedure — Weigh accurately about 1·3 g of the sample and dissolve in 50 ml of water in a glass-stoppered flask. Add 3 g of potassium iodide, 2 ml of acetic acid and 20 ml of zinc sulphate solution to this. Stopper and shake thoroughly. Immediately titrate the liberated iodine with sodium thiosulphate solution using the starch indicator.

A-2.3 Calculation

Assay [as percent by mass of $K_3Fe(CN)_6$]

$$= \frac{32{\cdot}92\ VN}{m}$$

where

V = volume in ml of sodium thiosulphate solution used for the titration,

N = normality of sodium thiosulphate solution, and

m = mass in g of the sample taken for the test.

A-3. DETERMINATION OF MATTER INSOLUBLE IN WATER

A-3.1 Procedure — Dissolve 20·0 ± 0·1 g of the sample in 100 ml of water. Filter through a tared sintered glass crucible (G-3) using suction. Wash with water until washings are colourless. Dry at 105 ± 2°C for 4 hours, cool in a desiccator and weigh to the nearest mg.

A-3.2 Calculation — Matter insoluble in water, percent by mass $= \frac{\text{Mass of residue}}{20} \times 100$

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*Specification for water for general laboratory use (*second revision*).

APPENDIX B

(*Clause* 4.1)

SAMPLING OF POTASSIUM FERRICYANIDE, PHOTOGRAPHIC GRADE

B-1. SCALE OF SAMPLING

B-1.1 In any consignment, all the bottles of the material manufactured in a single batch produced under similar conditions shall constitute a lot.

B-1.1.1 In order to ascertain the conformity of the lot to the requirements of this specification, samples shall be tested from each lot separately.

B-1.2 The number of bottles to be chosen from the lot shall depend upon the size of the lot and shall be in accordance with Table 2.

TABLE 2 NUMBER OF BOTTLES TO BE SELECTED

Lot Size (1)	Sample Size (2)
Up to 25	3
26 to 50	4
51 to 100	5
101 and above	7

B-1.3 These bottles shall be chosen at random from the lot and in order to ensure the randomness of selection, the procedure given in IS : 4905-1968* may be followed.

B-2. NUMBER OF TESTS

B-2.1 Tests for the requirement of assay content, given in Table 1 shall be conducted on individual sample.

B-2.2 Tests for other requirement given in Table 1 and **2.2** shall be conducted on composite sample.

B-3. PREPARATION OF COMPOSITE SAMPLE

B-3.1 The material shall be taken from each selected bottle in required quantities in a container and mixed thoroughly for preparing a composite sample.

B-4. CRITERIA FOR CONFORMITY

B-4.1 The lot shall be considered to be satisfactory with respect to assay content if the following conditions are satisfied:

From the test results, the average ($\bar{X}$) and range (R) shall be calculated.

$$\text{Average } \bar{X} = \frac{\text{Sum of the test results}}{\text{Number of tests}}$$

Range R = Difference between the maximum and minimum values of the test results

The value of expression $\frac{R}{U - L} \leqslant 0{\cdot}9$

$$\bar{X} + 0{\cdot}6R \leqslant U$$

$$R - 0{\cdot}6\bar{X} \geqslant L$$

where U and L are the upper and lower specification limits given in Table 1.

B-4.2 For the remaining characteristics tested on composite sample, the results shall meet the relevant requirements given in Table 1 and **2.2**.

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*Methods for random sampling.

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